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ABSTRACT

The socioeconomic backgrounds of typewriting students as such backgrounds affect typewriting performance is evaluated in this research. There is convincing evidence that socioeconomic factors play a significant role in affecting typewriting performance. Students from low socioeconomic backgrounds are almost always associated with the poorest typewriting performances, while students from high socioeconomic backgrounds are almost always associated with the best typewriting performances. The study involved 383 Typing III students from seven high schools considered representative of high, middle, and low socioeconomic status neighborhoods in the Los Angeles Unified School District. The findings and data analysis are tabulated and discussed. (Author/BP)

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EFFECTS OF SOCIO-ECONOMIC BACKGROUND FACTORS ON TYPEWRITING SPEED AND ACCURACY

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ABSTRACT

The socio-economic backgrounds of typewriting students as such backgrounds affect typewriting performance is evaluated in this research. There is convincing evidence that socio-economic factors play a significant role in affecting typewriting performance. Students from low socio-economic backgrounds are almost always associated with the poorest typewriting performances, while students from high socio-economic backgrounds are almost always associated with the best typewriting performances.

Typewriting is generally taught without much consideration for differences in the socio-economic status (SES) or background of students. Recent studies by Robinson (1966) and Erickson (1975) indicate that selected typewriting copy difficulty factors, generally acknowledged to be highly related to a more nearly accurate measurement of straight-copy skill, significantly affect typing speed and accuracy. Since straight-copy typewriting skill is also related to verbal skills, which are classically associated with differences in socio-economic status (SES), it seems reasonable to expect that typewriting performance may be significantly related to SES. The primary objective of this study was to assess the relationship between typewriting performance and socio-economic background or status of students enrolled in typewriting.

Specifically, the concern was with determining (1) if there were significant differences in straight-copy typing performance (i.e., with varied conditions of copy difficulty--see study by Erickson, 1975) between students from high, middle, and low SES backgrounds; (2) the nature of the relationship between typewriting performance, SES background, and copy difficulty;

and, (3) the extent to which SES factors have a constant effect upon typewriting performance.

Sample

The study involved 383 Typing III students from seven high schools considered representative of high, middle, and low SES neighbornoods in the Los Angeles Unified School District. The seven schools were selected and classified on the basis of (1) 1970 community census data (reported in Table 1), and (2) the percent of white, black, and Spanish-surname students enrolled in a school (also shown in Table 1).

TABLE 1
Socio-Economic Status (SES) Criteria—School Classifications

High School	Average Family Income	Market Value of Home	Percent Low Income Children*	Percent Adults Earning High School Diploma	Percent Spanish Surname	Percent Black	Percent Asian	Percent White	Percent American Indian
Low SES									
L1	$ 7,325	$14,812	20.12	38.42	3.20	94.69	1.75	0.30	0.06
L2	7,602	15,639	14.39	22.17	84.29	5.93	7.06	2.69	0.03
Middle SES									
M1	10,529	20,938	7.83	43.70	45.25	10.91	2.54	41.06	0.24
M2	11,895	20,421	4.70	46.89	19.03	2.02	3.97	74.44	0.54
M3	12,121	24,750	7.43	48.60	21.01	7.87	7.36	63.54	0.22
High SES									
H1	13,437	28,043	3.60	59.88	5.53	0.13	0.48	93.80	0.06
H2	16,226	32,904	2.88	57.47	2.21	1.60	1.20	94.95	0.04

* Children, ages 5-17, from families with annual incomes of less than $3,000

Criterion Measures

A series of five 5-minute straight-copy timed writings, which progressed in difficulty from test to test, as designed by Robinson (1966) was administered to each student (one per day) at the end of the Typing III semester. The straight-copy test series was designed to measure the combined effects of stroke intensity, syllable intensity, and percent of high-frequency words on typewriting speed and errors.

The five tests were contained in a booklet which provided students with specific directions for taking and scoring the tests. Scoring was based on extracts from and adaptations of International Typewriting Contest Rules. Each student reported a gross-words-a-minute rate (GWAM), and total errors (E) made. A net-words-a-minute rate (NWAM: GWAM rate minus twice E) for each of the 5-minute timed writings on the five different straight-copy tests was computed by this investigator and made a part of the analysis, even though it is recognized that there is little justification for the use of NWAM rates in evaluating the performance of typewriting students.

Findings

GWAM, E, and NWAM means and standard deviations were calculated and are reported in Tables 2, 3, and 4, respectively. Average-criterion and average-school scores are also shown in the tables.

Table 2. School GWAM Means and Standard Deviations

School		L1	L2	M1	M2	M3	H1	H2	Average Criterion Scores (Each Test)
Test	1	44.52	43.61	45.87	49.89	50.59	51.38	54.56	48.30
	2	44.75	43.51	45.84	49.41	49.85	50.55	54.00	47.96
	3	44.64	43.64	45.37	49.55	49.48	50.00	53.62	47.79
	4	45.66	42.04	44.59	47.10	47.85	47.75	51.03	46.22
	5	40.66	39.95	43.54	46.62	47.70	46.42	50.40	44.60
Average School Scores		44.04	42.55	45.04	48.51	49.09	49.22	52.72	46.97
N		48	94	40	56	27	54	64	383
Standard Deviation	1	7.44	7.85	9.06	8.45	6.49	7.87	5.78	
	2	8.39	7.47	8.62	7.18	6.61	7.49	5.83	
	3	8.54	7.74	8.80	7.85	5.74	8.11	6.19	
	4	8.97	7.50	9.04	7.87	6.55	7.39	6.91	
	5	9.42	6.96	8.06	7.89	7.19	8.21	6.21	

Table 3. School Error Means and Standard Deviations

School		L1	L2	M1	M2	M3	H1	H2	Average Criterion Scores (Each Test)
Test	1	10.68	13.88	9.67	8.98	13.03	5.33	8.01	10.08
	2	10.47	9.20	9.77	9.19	12.59	6.53	6.48	8.83
	3	12.60	12.19	10.40	10.71	11.22	6.74	8.59	10.40
	4	11.31	10.52	10.32	11.10	12.22	5.88	7.56	9.65
	5	11.81	11.80	10.47	12.48	12.44	7.75	9.32	10.82
Average School Scores		11.37	11.52	10.13	10.49	12.30	6.45	7.99	9.95
N		48	94	40	56	27	54	64	383
Standard Deviation	1	6.35	7.27	5.37	8.54	7.28	2.52	4.28	
	2	7.05	4.77	8.73	6.15	8.89	4.34	4.21	
	3	6.60	7.34	8.52	8.56	6.45	3.70	5.69	
	4	6.69	6.12	6.32	9.01	7.01	3.58	3.68	
	5	6.44	6.76	5.42	7.63	5.12	3.99	5.36	

Table 4. School NWAM Means and Standard Deviations

School		L1	L2	M1	M2	M3	H1	H2	Average Criterion Scores (Each Test)
Test	1	23.14	15.85	26.52	31.92	24.51	40.72	38.53	28.13
	2	23.79	25.10	26.29	31.01	24.66	37.48	41.03	30.30
	3	19.43	19.26	24.57	28.12	27.03	36.51	36.43	26.98
	4	23.04	21.00	23.95	24.89	23.40	35.98	35.90	26.90
	5	17.04	16.34	22.59	21.66	22.81	30.90	31.75	22.94
Average School Scores		21.29	19.51	24.78	27.52	24.48	36.32	36.73	27.05
N		48	94	40	56	27	54	64	383
Standard Deviation	1	15.99	15.81	14.98	19.92	16.03	9.46	10.62	
	2	17.00	12.18	18.38	15.11	19.07	11.51	10.69	
	3	15.33	17.42	20.17	17.11	14.25	11.01	14.59	
	4	16.53	14.33	15.06	19.95	14.23	10.98	10.51	
	5	15.43	15.25	13.39	17.72	11.99	11.67	12.43	

Average SES-group GWAM, E, and NWAM scores were calculated and analyzed using Dunn's Multiple Comparison Procedure. The results of these analyses are shown in Table 5, with supporting data in Table 5A. These data indicate significant performance differences in overall typewriting speed (GWAM), errors (E), and net words a minute (NWAM) between students from high and low SES backgrounds. The results also indicate significant differences in typewriting errors (E) and net words a minute (NWAM) scores between students from high and middle SES backgrounds.

Table 5. Results of Dunn's Multiple Comparison Test for Differences Between Average SES-Group Performance (See Table 5A)

SES Comparison	GWAM	E	NWAM
High v. Middle		*	**
High v. Low	**	*	**
Middle v. Low			

* p<.05
** p<.01

Table 5A. SES Group Performance

SES Group	GWAM*	ERROR*	NAWM*
High	51.12	7.28	36.54
Middle	47.51	10.62	25.96
Low	43.05	11.47	20.11

*Adjusted for N

Performance scores were then analyzed in a two-way repeated measures analysis of variance. The results of all three analyses (GWAM, E, and NWAM) indicated statistically significant differences in both the schools factor (i.e., between schools), and in the test factor (i.e., between tests) for the criterion measures in question. The results of these analyses are reported in Tables 6 through 8.

Table 6. Analysis of Variance: GWAM

Source	df	MS	F
Schools (S)	6	4199.58	16.81**
Error	376	249.90	
Tests (T)	4	747.79	73.19**
S × T	24	28.35	2.77**
Error	1504	10.22	

** p<.001

Table 7. Analysis of Variance: Error

Source	df	MS	F
Schools (S)	6	14971.84	21.63**
Error	376	692.09	
Tests (T)	4	2109.69	20.26**
S × T	24	274.42	2.63**
Error	1504	104.12	

** p<.001

Table 8. Analysis of Variance: NWAM

Source	df	MS	F
Schools (S)	6	1168.76	11.56**
Error	376	101.09	
Tests (T)	4	132.57	5.41**
S × T	24	59.99	2.45**
Error	1504	24.49	

** p<.01

The assumption of significant differences in test-copy difficulty seems tenable in view of (1) observed differences in average criterion scores (shown in Tables 2, 3, and 4); and, (2) statistically significant F ratios ($p < .001$) for differences in test criterion means (Tables 6, 7, and 8). Since the effects of copy difficulty on typewriting speed and errors have been discussed (Erickson, 1975), the focus of this study will be on examining the nature of differences in typewriting performance of students from different SES backgrounds.

The ANOVA results in Tables 6 through 8 indicate statistically significant school-by-criterion (GWAM, E, NWAM) interaction effects. Examination of school performance patterns in Tables 2 through 4, however, suggest that this finding may not so much be due to SES factors as it is indicative of a non-linear relationship between typewriting speed and errors. This hypothesis will be examined in greater detail in a later section of this study.

The next phase of the analysis was aimed at investigating the extent to which observed differences between SES groups were maintained at different levels of copy difficulty. The earlier study by Erickson (1975), employing the same test series, suggested that tests 2, 4, and 5 produced the greatest intertest differences in criterion scores. These tests were selected, therefore, to examine the relationship between school SES-group performance and copy difficulty.

This phase of the analysis was carried out with a series of simple main effects tests using the Newman-Keuls procedure to compare each school's mean score for a particular test to every other school's mean score for the criterion measure in question.

Examination of test hierarchy patterns in Tables 9 through 11 suggests that SES-group differences are most pronounced at the end points (Test 2 vs.

Test 5) of the copy difficulty continuum. The results also suggest that schools in the same SES group perform with greater similarity than schools in different SES groups. For example, low SES-group schools are almost always associated with the poorest performances, while high SES schools are almost always associated with the best performances. It is also noted that even though observed differences between middle and low SES schools are not statistically significant that, in general, middle SES schools perform somewhat better than low SES schools on all criterion measures with the possible exception of error scores when such scores are considered without reference to speed scores.

Table 9. Results of Newman-Keuls Comparisons for GWAM Differences Between Schools on Tests 2, 4, and 5

	Mean	School	L 2	L 1	M 1	M 2	M 3	H 1	H 2
Test 2	43.51	L2				•	•	•	•
	44.75	L1				•	•	•	•
	45.84	M1				•	•	•	•
	49.41	M2							•
	49.85	M3							•
	50.55	H1							•
	54.00	H2							

	Mean	School	L 2	M 1	L 1	M 2	H 1	M 3	H 2
Test 4	42.04	L2				•	•	•	•
	44.59	M1							•
	45.66	L1							•
	47.10	M2							
	47.75	H1							
	47.85	M3							•
	51.03	H2							

	Mean	School	L 2	L 1	M 1	H 1	M 2	M 3	H 2
Test 5	39.95	L2				•	•	•	•
	40.66	L1				•	•	•	•
	43.54	M1						•	•
	46.42	H1							
	46.62	M2							•
	47.70	M3							
	50.40	H2							

* p<.05

Table 10. Results of Newman-Keuls Comparisons for *Error* Differences Between Schools on Tests 2, 4, and 5

	Mean	School	H 2	H 1	M 2	L 2	M 1	L 1	M 3
Test 2	6.48	H2						•	•
	6.53	H1						•	•
	9.19	M2							
	9.20	L2							
	9.77	M1							
	10.47	L1							
	12.59	M3							

	Mean	School	H 1	H 2	M 1	L 2	M 2	L 1	M 3
Test 4	5.88	H1		•	•	•	•	•	•
	7.56	H2			•	•	•	•	•
	10.32	M1							
	10.52	L2							
	11.10	M2							
	11.31	L1							
	12.22	M3							

	Mean	School	H 1	H 2	M 1	L 2	L 1	M 3	M 2
Test 5	7.75	H1				•	•	•	•
	9.32	H2							
	10.47	M1							
	11.80	L2							
	11.81	L1							
	12.44	M3							
	12.48	M2							

* p<.05

Table 11. Results of Newman-Keuls Comparisons for NWAM Differences Between Schools on Tests 2, 4, and 5

	Mean	School	L 1	M 3	L 2	M 1	M 2	H 1	H 2
Test 2	23.79	L1						*	*
	24.66	M3						*	*
	25.10	L2						*	*
	26.29	M1						*	*
	31.01	M2						*	*
	37.48	H1							
	41.03	H2							

	Mean	School	L 2	L 1	M 3	M 1	M 2	H 1	H 2
Test 4	21.00	L2						**	**
	23.04	L1						**	**
	23.40	M3						**	**
	23.95	M1						**	**
	24.89	M2						**	**
	35.90	H1							
	35.98	H2							

	Mean	School	L 2	L 1	M 2	M 1	M 3	H 1	H 2
Test 5	16.34	L2						*	*
	17.04	L1						*	*
	21.66	M2						*	*
	22.59	M1						*	*
	22.81	M3							
	30.90	H1							
	31.75	H2							

* $p<.05$
** $p<.01$

The last phase of the study focused on determining the degree to which schools in different SES categories exhibited similar "intraschool" performance patterns (e.g., Was performance on Test 5, which was the most difficult according to the difficulty factors, significantly poorer in all schools than performance on Test 1, which was the least difficult?).

Students' test scores in each school were first analyzed using a single factor repeated measures analysis of variance. Newman-Keuls comparisons were then made to more clearly identify the nature of the "intraschool" performance patterns. The results of the Newman-Keuls comparisons are shown in Tables 12, 13, and 14 for those schools in which the previous ANOVA showed significant differences in test-criterion performance.

Table 12. Results of Newman-Keuls Comparisons for Intraschool GWAM Differences

School L1

Mean	Test	4 2 3 1 5
45.66	4	•
44.75	2	•
44.64	3	•
44.52	1	•
40.66	5	

School L2

Mean	Test	3 1 2 4 5
43.64	3	•
43.61	1	•
43.51	2	• •
42.04	4	•
39.95	5	

School M1

Mean	Test	1 2 3 4 5
45.87	1	•
45.84	2	•
45.37	3	•
44.59	4	
43.54	5	

School M2

Mean	Test	1 2 3 4 5
49.89	1	• •
49.55	3	• •
49.41	2	• •
47.10	4	
46.62	5	

School M3

Mean	Test	1 2 3 4 5
50.59	1	• •
49.85	2	• •
49.48	3	• •
47.85	4	
47.70	5	

School H1

Mean	Test	1 2 3 4 5
51.38	1	• •
50.55	2	• •
50.00	3	• •
47.75	4	•
46.42	5	

School H2

Mean	Test	1 2 3 4 5
54.56	1	• •
54.00	2	• •
53.62	3	• •
51.03	4	
50.40	5	

* $p<.05$

Table 13. Results of Neuman-Keuls Comparisons for Intraschool Error Rate Differences

School L2

Mean	Test	1 3 5 4 2
13.88	1	• •
12.19	3	•
11.80	5	•
10.52	4	
9.20	2	

School M2

Mean	Test	5 4 3 2 1
12.48	5	• •
11.10	4	
10.71	3	
9.19	2	
8.98	1	

* $p<.05$

Table 14. Results of Neuman-Keuls Comparisons for Intraschool NWAM Differences

School L1

Mean	Test	2 1 4 3 5
23.79	2	•
23.14	1	•
23.04	4	•
19.43	3	
17.04	5	

School L2

Mean	Test	2 4 3 5 1
25.10	2	• • •
21.00	4	
19.26	3	
16.34	5	
15.85	1	

School M2

Mean	Test	1 2 3 4 5
31.92	1	• •
31.01	2	• •
28.12	3	•
24.89	4	
21.66	5	

School H1

Mean	Test	1 2 3 4 5
49.72	1	•
37.48	2	•
36.51	3	•
35.98	4	•
30.90	5	

School H2

Mean	Test	2 1 3 4 5
41.03	2	•
38.53	1	•
36.43	3	
35.90	4	
31.75	5	

* $p<.05$

Because of the interest in comparing intraschool performance patterns, schools in which significant differences in test-criterion means were not observed (i.e., those not shown in Tables 12 through 14) are as important in this phase of the analysis as those in which significant intraschool differences were observed. For example, Table 13 indicates that significant differences in test error rates were observed in only two schools even though (1) Table 12 indicates that significant differences in GWAM were observed in all schools; and, (2) Table 14 indicates that significant differences in NWAM were observed in all but two schools. This observation lends support to the earlier contention that the relationship between typewriting speed and errors is not linear. The observation does not mean, however, that a person who generally types 40 words a minute could just as readily type faster with the same degree of accuracy. Rather, it suggests that a person adjusts his typing speed so as not to make more than a limited number of errors (approximately an average of 10 for all the tests in this test series).

As previously noted, Table 12 indicates that significant differences in GWAM test means were observed in all schools. However, examination of GWAM means indicates that (1) test performance was within one word for the first three tests (Tests 1-3) in all schools but two (where the differences were 1.11 and 1.33); and, (2) that tests 4 and 5 resulted in the poorest performance in all but one school (and even in this school, L1, there may have been some extraneous factor operating which could have accounted for the highest rate being made by these students on Test 4). The overall finding suggests that differences between schools in different SES groups (and between SES groups) are more or less constant in nature.

Conclusions

The findings of this study leave little doubt as to whether SES background factors play a significant role in affecting typewriting performance. The data indicate that statistically significant differences in typewriting speed and errors exist at all levels of copy difficulty. One might also infer that the language handicap which characterizes many Spanish-surname students also seems to depress typewriting performance.

Analysis of "intraschool" GWAM, error, and NWAM differences indicates that the greatest performance differences between students from high, middle, and low SES backgrounds occur at the end points of the copy difficulty continuum (i.e., between the easy and most difficult copy).

Analysis of "intraschool" GWAM, error, and NWAM performance patterns suggest that observed differences between high, middle, and low SES groups are more or less constant in nature. In addition, the nature of interschool and intraschool performance differences suggest a strong linear relationship between the socio-economic status of students and typewriting performance.

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